

I Claim:

1. A prosthesis system for replacing facet joints on adjoining vertebral bodies comprising  
a caudal prosthesis accommodating fixation to  
5 a first vertebral body at or near a pedicle and without support by a lamina, including a first artificial caudal facet joint structure adapted and configured to replace all or a portion of a caudal portion of a natural facet joint between the first vertebral body and an adjoining  
10 second vertebral body superior to the first vertebral body,  
a cephalad prosthesis accommodating fixation to the second vertebral body at or near a pedicle and without support by a lamina, including an artificial  
15 cephalad facet joint structure adapted and configured to replace all or a portion of a cephalad portion of the natural facet joint between the adjoining first and second vertebral bodies and to articulate with the first artificial caudal facet joint structure, thereby forming  
20 an artificial facet joint between the adjoining first and second vertebral bodies, and  
a second artificial caudal facet joint structure fixed superior to the artificial cephalad facet joint structure on the second vertebral body, the second  
25 artificial caudal facet joint structure being adapted and configured to replace all or a portion of a caudal portion of a natural facet joint between the second vertebral body and an adjoining third vertebral body superior to the second vertebral body, and to articulate  
30 with a cephalad portion of the facet joint between the adjoining second and third vertebral bodies, thereby forming a facet joint between the adjoining second and third vertebral bodies.
2. A prosthesis system according to claim 1  
35 wherein at least one of the first and second

artificial caudal facet joint structures is adapted and configured to replace a natural articular process of a caudal portion of the respective one of the natural facet joints on the respective one of the vertebral bodies.

5                   3.     A prosthesis system according to claim 1  
                  wherein at least one of the first and second  
artificial caudal facet joint structures is adapted and  
configured to replace a natural articular process of a  
caudal portion of the respective one of natural facet  
10 joints after removal of at least some of a lamina from  
the respective one of the vertebral bodies.

                  4.     A prosthesis system according to claim 1  
                  wherein at least one of the artificial caudal  
facet joint structures is adapted and configured to  
15 replace a natural articular process of a caudal portion  
of the respective one of the natural facet joints after  
removal of at least part of a mamillary process from the  
respective one of the vertebral bodies.

                  5.     A prosthesis system according to claim 1  
20                   wherein at least one of the artificial caudal  
facet joint structures is adapted and configured to  
replace a natural articular process of a caudal portion  
of the respective one of the natural facet joints after  
removal of at least part of a transverse process from the  
25 respective one of the vertebral bodies.

                  6.     A prosthesis system according to claim 1  
                  wherein at least one of the first and second  
artificial caudal facet joint structures is adapted and  
configured to replace a natural articular process of a  
30 caudal portion of the respective one of the natural facet  
joints after removal of at least part of a pedicle from  
the respective one of the vertebral bodies.

                  7.     A prosthesis system according to claim 1  
                  wherein at least one of the first and second  
35 artificial caudal facet joint structures is adapted and

configured to replace a natural articular process of a caudal portion of the respective one of the natural facet joints after removal of at least some of the natural articular process from the respective one of the vertebral bodies.

8. A prosthesis system according to claim 1 wherein at least one of the first and second artificial caudal facet joint structures is adapted and configured to replace a natural articular process of a caudal portion of the respective one of the natural facet joints after removal of at least some of the natural articular process and of at least some of a lamina from the respective one the vertebral bodies.

9. A prosthesis system according to claim 1 wherein at least one of the first and second artificial caudal facet joint structures is adapted and configured to replace a natural articular process of a caudal portion of the respective one of the natural facet joints after removal of at least some of the natural articular process and of at least some of a mamillary process from the respective one of the vertebral bodies.

10. A prosthesis system according to claim 1 wherein at least one the artificial caudal facet joint structures is adapted and configured to replace a natural articular process of a caudal portion of the respective one of the natural facet joints after removal of at least some of the natural articular process and of at least part of a transverse process from the respective one of the vertebral bodies.

11. A prosthesis system according to claim 1 wherein at least one of the first and second artificial caudal facet joint structures is adapted and configured to replace a natural articular process of a caudal portion of the respective one of the natural facet joints after removal of at least some of the natural

articular process and of at least part of a pedicle from the respective one of the vertebral bodies.

12. A prosthesis system according to claim 1 wherein the artificial cephalad facet joint  
5 structure is adapted and configured to replace a natural articular process of a cephalad portion of the natural facet joint on the second vertebral body.

13. A prosthesis system according to claim 1 wherein the artificial cephalad facet joint  
10 structure is adapted and configured to replace a natural articular process of a cephalad portion of the natural facet joint after removal of at least some of a lamina from the second vertebral body.

14. A prosthesis system according to claim 1 wherein the artificial cephalad facet joint  
15 structure is adapted and configured to replace a natural articular process of a cephalad portion of the natural facet joint after removal of at least part of an accessory process from the second vertebral body

15. A prosthesis system according to claim 1 wherein the artificial cephalad facet joint  
20 structure is adapted and configured to replace a natural articular process of a cephalad portion of the natural facet joint after removal of at least part of a transverse process from the second vertebral body.  
25

16. A prosthesis system according to claim 1 wherein the artificial cephalad facet joint  
structure is adapted and configured to replace a natural articular process of a cephalad portion of the natural  
30 facet joint after removal of at least part of a pedicle from the second vertebral body.

17. A prosthesis system according to claim 1 wherein the artificial cephalad facet joint  
structure is adapted and configured to replace a natural  
35 articular process of a cephalad portion of the natural

facet joint after removal of at least some of the natural articular process from the second vertebral body.

18. A prosthesis system according to claim 1 wherein the artificial cephalad facet joint structure is adapted and configured to replace a natural articular process of a cephalad portion of the natural facet joint after removal of at least some of the natural articular process and of at least some of a lamina from the second vertebral body.

19. A prosthesis system according to claim 1 wherein the artificial cephalad facet joint structure is adapted and configured to replace a natural articular process of a cephalad portion of the natural facet joint after removal of at least some of the natural articular process and of at least some of an accessory process from the second vertebral body.

20. A prosthesis according to claim 1 wherein the artificial cephalad facet joint structure is adapted and configured to replace a natural articular process of a cephalad portion of the natural facet joint after removal of at least some of the natural articular process and of at least part of a transverse process from the second vertebral body.

21. A prosthesis system according to claim 1 wherein the artificial cephalad facet joint structure is adapted and configured to replace a natural articular process of a cephalad portion of the natural facet joint after removal of at least some of the natural articular process and of at least part of a pedicle from the second vertebral body.

22. A prosthesis system according to claim 1 wherein the caudal prosthesis is adapted and configured to replace at least some of a pedicle of the first vertebral body.

23. A prosthesis system according to claim 1

wherein the caudal prosthesis is adapted and configured to replace at least some of a lamina of the first vertebral body.

24. A prosthesis system according to claim 1  
5 wherein the caudal prosthesis is adapted and configured to replace at least some of a mamillary process of the first vertebral body.

25. A prosthesis system according to claim 1  
10 wherein the cephalad prosthesis is adapted and configured to replace at least some of a lamina of the second vertebral body.

26. A prosthesis system according to claim 1  
15 wherein the cephalad prosthesis body is adapted and configured to replace at least some of a mamillary process of the second vertebral body.

27. A prosthesis system according to claim 1  
wherein at least one of the artificial facet joint structures is made of at least one selected prosthetic material.

20 28. A prosthesis system according to claim 27 wherein the selected prosthetic material includes polyethylene, rubber, tantalum, titanium, chrome cobalt, surgical steel, bony in-growth material, ceramic, artificial bone, or a combination thereof.

25 29. A prosthesis system according to claim 1 wherein at least one of the caudal and cephalad prosthesis includes a fastening element installed within the vertebral body at or near a pedicle.

30 30. A prosthesis system according to claim 29 wherein the fastening element includes a screw installed within the vertebral body at or near a pedicle.

31. A prosthesis system according to claim 29 wherein the fastening element includes a stem installed within the vertebral body at or near a pedicle.

35 32. A prosthesis system according to claim 29

wherein the fastening element including means for resisting rotation after installation in the vertebral body.

5           33. A prosthesis system according to claim 1 wherein at least one of the caudal and cephalad prosthesis is fixed to the vertebral body by an adhesive or cement.

10           34. A prosthesis system according to claim 1 wherein at least one of the caudal and cephalad prosthesis includes a bony in-growth material.

15           35. A prosthesis system according to claim 1 wherein the caudal prosthesis includes a fastening element installed within the vertebral body at or near a pedicle, and wherein the first artificial caudal facet joint structure is carried by the fastening element.

20           36. A prosthesis system according to claim 35 wherein the fastening element includes a screw installed within the vertebral body at or near a pedicle.

25           37. A prosthesis system according to claim 35 wherein the fastening element includes a stem installed within the vertebral body at or near a pedicle.

30           38. A prosthesis system according to claim 35 wherein the fastening element including means for resisting rotation after installation in the vertebral body.

35           39. A prosthesis system according to claim 1 wherein the second artificial caudal facet joint structure is carried by a fastening element installed within the superior vertebral body at or near a pedicle.

40           40. A prosthesis system according to claim 39 wherein the fastening element includes a screw installed within the vertebral body at or near a pedicle.

41           41. A prosthesis system according to claim 39

wherein the fastening element includes a stem installed within the vertebral body at or near a pedicle.

42. A prosthesis system according to claim 39 wherein the fastening element including means  
5 for resisting rotation after installation in the vertebral body.

43. A prosthesis system according to claim 39 wherein the fastening element fixes the cephalad prosthesis to the superior vertebral body.

10 44. A method of replacing natural facet joints between adjoining vertebral bodies using the prosthesis system defined in claim 1 to provide improved support for the spinal column, the method comprising the steps of

15 (i) removing from a first vertebral body all or a portion of a caudal portion of the natural facet joint between the first vertebral body and an adjoining second vertebral body superior to the first vertebral body,

20 (ii) removing from the second vertebral body all or a portion of a cephalad portion of the natural facet joint between the first and second vertebral bodies,

25 (iii) removing from the second vertebral body all or a portion of a caudal portion of a natural facet joint between the second vertebral body and an adjoining third vertebral body superior to the second vertebral body,

30 (iv) fixing the caudal prosthesis as defined in claim 1 to the first vertebral body to replace the removed caudal portion of the natural facet joint with the first artificial caudal facet joint structure as defined in claim 1,

35 (v) fixing the cephalad prosthesis as defined in claim 1 to the second vertebral body to replace the



removed cephalad portion of the natural facet joint with the artificial cephalad facet joint structure as defined in claim 1,

(vi) fixing the second artificial caudal facet joint structure as defined in claim 1 to the second vertebral body to replace the removed caudal portion of the facet joint with the second artificial caudal facet joint structure as defined in claim 1,

(vii) affecting articulation between the first artificial caudal facet joint structure and the artificial cephalad facet joint structure to create an artificial facet joint between the adjoining first and second vertebral bodies, and

(viii) affecting articulation between the second artificial caudal facet joint structure and the cephalad portion of the facet joint between the adjoining second and third vertebral bodies to create a facet joint between the adjoining first and second vertebral bodies.

45. A method according to claim 44 further including a step of removing at least some of the lamina from at least one of the first and second vertebral bodies.

46. A method according to claim 44 further including a step of removing at least part of a mamillary process from at least one of the first and second vertebral bodies.

47. A method according to claim 44 further including a step of removing at least part of a transverse process from at least one of the first and second vertebral body.

48. A method according to claim 44 further including a step of removing at least part of a pedicle from at least one of the first and second vertebral bodies.

49. A method according to claim 44

further including a step of removing at least part of an accessory process from the second vertebral body.